

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.**

THIS PAGE BLANK (USPTO)

PATENT SPECIFICATION

Convention Date (Denmark): Nov. 15, 1937.

521,285

Application Date (in United Kingdom): Nov. 15, 1938. No. 28663/39.

(Divided out of No. 520,610.)

Complete Specification Accepted: May 16, 1940.



COMPLETE SPECIFICATION

Improvements in or relating to Plate Heat Exchanging Apparatus

WE, MARTIN LARSEN, CHARLES ZEUTHEN and RICHARD ZEUTHEN, all Subjects of the King of Denmark, trading as the firm Silkeborg Maskinfabrik, Zeuthen Og Larsen, of Silkeborg, Denmark, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:

The invention relates to plate heat exchanging apparatus of the kind comprising a series of plates suitably ribbed or corrugated to provide between each plate and the plates on either side of it a number of passages for the flow of fluid over the plates.

The object of the invention is to provide an improved construction of plate heat exchanging apparatus of this kind which will ensure a high order of efficiency of heat transmission, due to the way in which the flow of the two fluids is disturbed by the arrangement of the ribs or corrugations of the plates.

According to the invention, a plate heat exchanging apparatus of the kind comprising a series of plates suitably ribbed or corrugated to provide between each plate and the plates on either side of it a number of passages for the flow of fluid over the plates, is characterised in that the ribs or corrugations are arranged in rows which extend transversely to the direction of flow of the fluid over the plates and in which the ribs or corrugations are inclined in different directions in successive rows relatively to said direction of flow of the fluid so that the fluid is caused to travel in a zig-zag path through the apparatus.

Preferably the ribs or corrugations of adjacent rows of a plate are offset relatively to one another by a distance equal to approximately half the pitch of the ribbing, so that the ends of the ribs of one row are situated between the adjacent ends of the ribs of the next row.

In order that the invention may be more readily understood and practised, an embodiment thereof will now be described with reference to the accompanying drawing which illustrates diagrammatically an elevation of one of the plates of a heat exchanging apparatus in accordance with the invention.

[Price 1/-]

In the construction illustrated in the drawing, a plate 1 for a heat exchanging apparatus has ribs 2 which are inclined relatively to the direction of the flow of the fluid, such as milk, through the apparatus from an inlet 6 to an outlet 7. The ribs 1 are short and are arranged in rows in such a manner that the ribs of alternate rows are inclined in one direction whilst the ribs of the other rows are inclined in the opposite direction.

As illustrated in the drawing, the rows of ribs are preferably offset relatively to one another by a distance equal to approximately half the pitch of the ribbing. The fluid enters through the inlet 6 and is distributed over the surface 8. The fluid then passes between the ribs of the row 9 and then between the ribs of the row 10 and so on across the full extent of the surface of the plate 1. The fluid leaves the plate 1 by way of the outlet 7.

It will be understood that instead of providing the plates with ribs, the plates may be corrugated in such a manner that the desired surface formation is obtained.

Furthermore, the ribs or corrugations of adjacent rows in the plates may, if desired, be formed in continuation with one another so as to result in a zig-zag or wavy formation of the ribs or corrugations across the plates.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A plate heat exchanging apparatus of the kind comprising a series of plates suitably ribbed or corrugated to provide between each plate and the plates on either side of it a number of passages for the flow of fluid over the plates, characterised in that the ribs or corrugations are arranged in rows which extend transversely to the direction of flow of the fluid over the plates and in which the ribs or corrugations are inclined in different directions in successive rows relatively to said direction of flow of the fluid so that the fluid is caused to travel in a zig-zag path through the apparatus.

2. A plate heat exchanging apparatus as claimed in Claim 1, wherein the ribs or corrugations of adjacent rows of a plate

are offset relatively to one another by a distance equal to approximately half the pitch of the ribbing.

3. A plate heat exchanging apparatus
5 as claimed in Claim 1 or Claim 2, wherein
the ribs or corrugations of adjacent rows
are formed in continuation with one
another so as to result in a zig-zag or wavy
10 formation of the ribs or corrugations
across the plates.

4. A plate heat exchanging apparatus
constructed substantially as hereinbefore
described with reference to the accom-
panying drawing.

5. A component ribbed or corrugated plate for a heat exchanging apparatus in accordance with any of the preceding Claims.

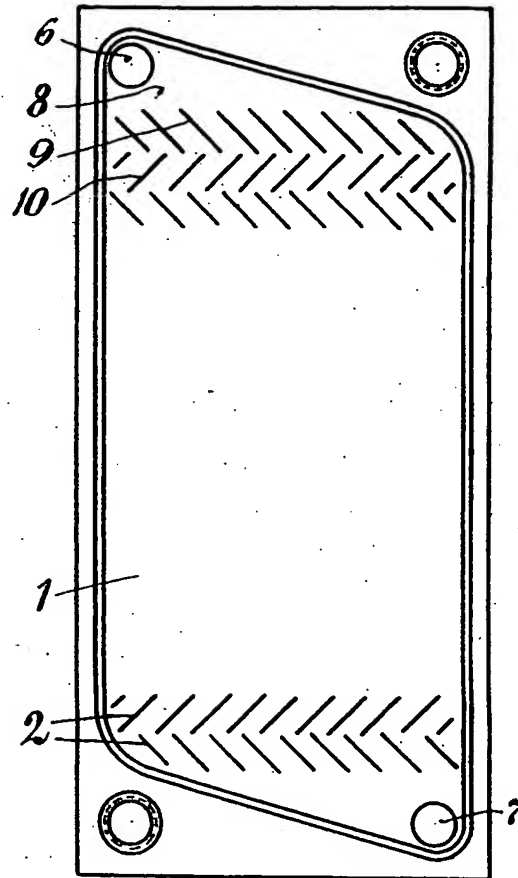
Dated this 25th day of October, 1939.

G. F. REDFERN & CO.,
Chartered Patent Agents.
Redfern House, Dominion Street,
London, E.C.2,
Agents for the Applicants.

= DAN 57135 (1940)
 = NETH 50782
 INCL. IN FR 845942

*57
 245:1*

[This Drawing is a full-size reproduction of the Original.]



164

THIS PAGE BLANK (USPTO)